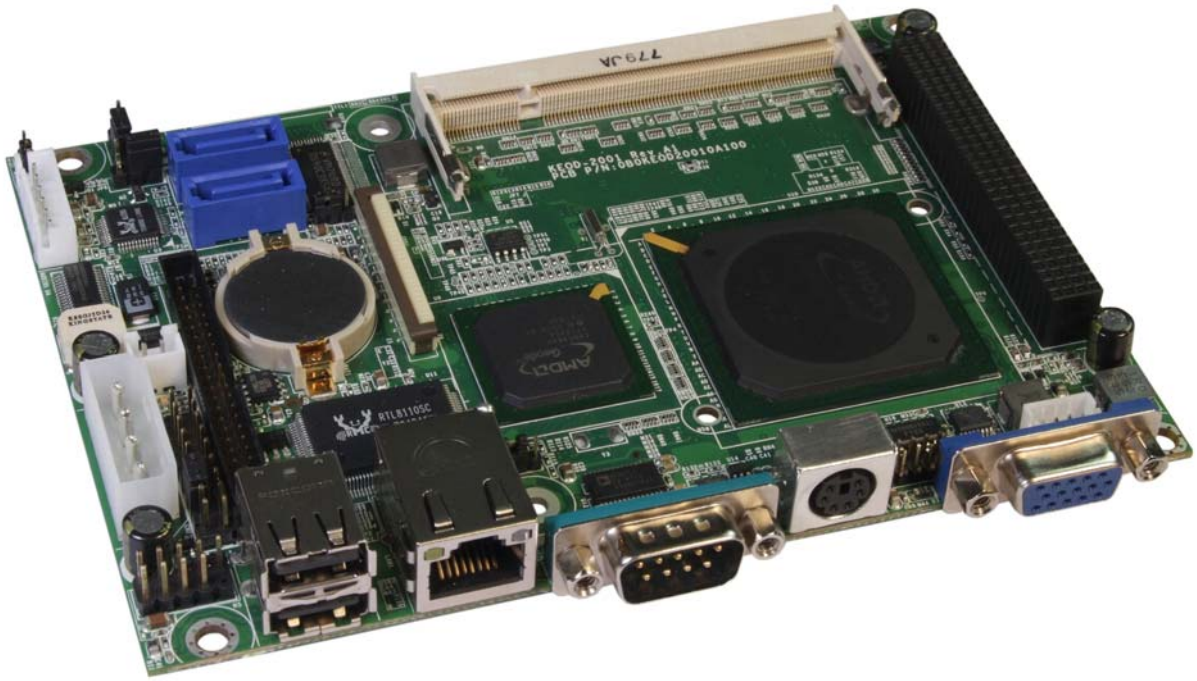
Kontron User's Guide



JRex*plus*-LX

Document Revision 0.1

PRELIMINARY

Table of Contents

1. USER INFORMATION 1

1.1 About This Document 1
1.2 Copyright Notice 1
1.3 Trademarks 1
1.4 Standards 1
1.5 Warranty 2
1.6 Technical Support 2

2. INTRODUCTION 3

2.1 JRex Embedded Line Family 3

3. GETTING STARTED 4

4. SPECIFICATIONS 5

4.1 Functional Specifications 5
4.2 Block Diagram 7
4.3 Mechanical Specifications 8
4.3.1 Module Dimensions 8
4.3.2 Height on Top 8
4.3.3 Height on Bottom 8
4.4 Electrical Specifications 9
4.4.1 Supply Voltage 9
4.4.2 Supply Voltage Ripple 9
4.4.3 Supply Current (typical, DOS prompt) 9
4.4.4 Supply Current (typical, Windows XP SP2) 9
4.4.5 RTC Battery 10
4.5 Environmental Specifications 11
4.5.1 Temperature 11
4.5.2 Humidity 11
4.6 MTBF 11

5. CPU, CHIPSET AND SUPER I/O 12

5.1 CPU 12
5.2 Chipset 12
5.3 Super I/O 12

6. SYSTEM MEMORY 13

7. PCI BUS EXPANSION 14

8. GRAPHICS INTERFACE 15

8.1 CRT Connector 15
8.2 LCD Panel Connectors 15
8.2.1 JILI30 Connector 16
8.2.2 18 Bit Digital Connector 17
8.2.3 18 Bit Digital Jumper Settings 18
8.3 Connecting a LCD Panel 18
8.4 Available Video Modes 18
8.4.1 Standard IBM-Compatible VGA Modes 19
8.4.2 Extended VESA VGA Modes 19
8.5 Backlight Connector 20

PRELIMINARY

9. SERIAL-PORT INTERFACES 21
9.1 Connector 21
10. PARALLEL-PORT INTERFACE 23
10.1 Connector 23
11. PS/2 KEYBOARD AND MOUSE INTERFACE 24
11.1 Connector 24
12. USB INTERFACE 25
12.1 Standard Connector 25
12.2 Pin Strip 25
13. FLOPPY-DRIVE INTERFACE 27
13.1 Connector 27
14. EIDE INTERFACE 28
14.1 Connector 28
14.2 Compact Flash Card Interface 29
15. SATA INTERFACE 31
15.1 Connector 31
16. ETHERNET CONTROLLER 32
16.1 Connector 32
17. AUDIO INTERFACE 33
17.1 Connector 33
18. DIGITAL INTERFACE 34
18.1 Electrical Specifications 34
18.1.1 Digital Inputs 34
18.1.2 Digital Outputs 34
18.2 Connector 34
19. POWER SUPPLY 35
19.1 Main Power Connector (AT/ATX) 35
19.2 Power Connector Supplement (ATX) 35
19.3 Power Pins 36
19.4 Power Front Panel Pins 36
20. COMMON FRONT PANEL PINS 37
20.1 Pin Strap 37
21. WATCHDOG TIMER 38
21.1 Configuration 38
21.2 Programming 38
21.2.1 Initialization 38
21.2.2 Trigger 38
22. HARDWARE MONITOR 39
22.1 Configuration 39
23. ONBOARD DEVICE CONFIGURATION 40

PRELIMINARY

24. SETUP GUIDE 42

24.1 Start PHOENIX/AWARD BIOS Setup Utility 42
24.2 General Information 42
24.3 Main Menu 43
24.4 Standard CMOS Features 43
24.4.1 IDE Master or Slave Submenu 44
24.5 Advanced BIOS Features 44
24.6 Advanced Chipset Features 45
24.7 Integrated Peripherals 46
24.8 PnP/PCI Configurations 47
24.8.1 IRQ Resources 47
24.8.2 Memory Resources 47
24.9 Power Management Setup 48
24.9.1 IRQ Wakeup Events 48
24.10 PC Health Status 48
24.11 Display Board Information 49
24.12 Kontron BIOS Extensions 50
24.12.1 JIDA BIOS Extension 50
24.12.2 Remote Control Client Extension 50
24.12.3 LAN PXE ROM 51

APPENDIX A: SYSTEM RESOURCEN 52

A.1 Interrupt Request (IRQ) Lines 52
A.2 Direct Memory Access (DMA) Channels 53
A.3 I/O Address Map 54
A.4 Memory Map 55
A.5 PCI Devices 56
A.6 SMBus Devices 56

APPENDIX B: CONNECTOR LAYOUT 57

B.1 Connector Locations 57
B.1.1 Top Side 57
B.1.2 Bottom Side 58
B.2 Pinout Tables 59

APPENDIX C: LITERATURE HINTS 63

C.1 General PC Architecture 63
C.2 Buses 63
C.3 Ports 64
C.3.1 RS-232 Serial 64
C.3.2 ATA 64
C.3.3 USB 64
C.4 Programming 64

APPENDIX D: REVISION HISTORY 65

PRELIMINARY

1. User Information

1.1 About This Document

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For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

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- IBM, XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corp.
- Microsoft is a registered trademark of Microsoft Corp.
- Intel is a registered trademark of Intel Corp.
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1.4 Standards

Kontron Embedded Modules GmbH is certified to ISO 9000 standards.

PRELIMINARY

1.5 Warranty

This Kontron Embedded Modules GmbH product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules GmbH will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron Embedded Modules GmbH will not be responsible for any defects or damages to other products not supplied by Kontron Embedded Modules GmbH that are caused by a faulty Kontron Embedded Modules GmbH product.

1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Before contacting Kontron Embedded Modules GmbH technical support, please consult our Website at http://www.kontron-emea.com/emd for the latest product documentation, utilities, and drivers. If the information does not help solve the problem, contact us by telephone or email.

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PRELIMINARY

2. Introduction

2.1 JRex Embedded Line Family

Each JRex is a member of the 3.5" SBC family of Kontron Embedded Modules GmbH.

JRex embedded line modules are characterized by the same surface pin-outs and interfaces for Reset logic and ATX power supply feature, 2 x USB, Fast LAN, PS/2 Keyboard and Mouse connector, Compact-Flash socket, VGA interface as well as one Serial Port. These embedded line family features allow to use of the same chassis over the whole product line and maximize design reuse.

JRex embedded line modules allow the use of standard laptop memories and full ATX power supplies.

These homogeneous features facilitate easy upgrades within the JRex embedded line product family. Connection of LCD panels is simplified when using the onboard standard JILI30 interface (**J**umptec® **I**ntelligent **L**VDS **I**nterface).

As part of the standard features package, all JRex embedded line modules come with a JIDA interface (**J**umptec® **I**ntelligent **D**evice **A**rchitecture), which is integrated into the BIOS of the SBC modules. This interface enables hardware independent access to the JRex features that can't be accessed via standard APIs. Functions such as watchdog timer, brightness of panel backlight and user bytes in EEPROM can be configured with ease by taking advantage of this standard JRex module feature.

PRELIMINARY

3. Getting Started

Getting started with the JRex*plus*-LX is very easy. Take the following steps:

❶ Connect the power supply to the JRex's power supply connector.

❷ Plug a suitable DDR-SDRAM memory module into the RAM socket.

❸ Connect the CRT monitor to the CRT interface or a LCD panel to the JILI30 interface by using the corresponding adapter cable.

❹ Plug a keyboard and/or mouse to the combined PS/2 connector by using a Y-cable.

❺ Connect the floppy drive with a data cable to the floppy interface and connect the power supply to the floppy's power connector.

❻ Plug a hard-drive data cable to the hard-disk interface. Attach the hard disk to the connector at the opposite end of the cable. If necessary, connect the power supply to the hard disk's power connector.

❼ Make sure all your connections have been made correctly. Turn on the power.

❽ Enter the BIOS by pressing the Del key during boot-up. Make all changes in the BIOS Setup. See the BIOS chapter of this manual for details.

PRELIMINARY

4. Specifications

4.1 Functional Specifications

- **Processor**
  - AMD Geode LX800 Embedded Processor
- **Internal Bus**
  - 33 MHz PCI bus
  - Up to 400 MHz memory bus
- **Chipset**
  - AMD Companion Chip CS5536
- **Power Supply**
  - Full ATX power supply support
  - Onboard power supply to low-voltage technology
- **Super I/O**
  - Winbond W83627EHG
- **Cache**
  - On-die second level 128 kB
- **Memory**
  - One 200-pin SODIMM interface run with DDR200 to DDR400 unbuffered DDR-SDRAM, up to 1GB
- **Two Serial Ports (COM A/B)**
  - COM1 and COM2 (RS-232 compatible)
  - Second Serial Port optionally as RS-422 or RS-485
- **One Parallel Port (LPT)**
  - Enhanced Parallel Port (EPP) and Extended Capabilities Port (ECP) with bidirectional capability
- **Floppy Interface**
- **EIDE-Interface (PATA)**
  - UDMA Peripheral Component Interconnect (PCI) Bus Master IDE ports (up to two devices)
- **Compact Flash Socket**

PRELIMINARY

SATA RAID Controller

- Supports RAID Level 0, RAID Level 1, RAID0+1 and JBOD for up to two devices
- Complies with Serial ATA Specification Rev. 1.0

Universal Serial Bus (USB)

- Four USB 2.0 ports (OHCI/EHCI)
- USB legacy keyboard support
- USB floppy boot support

Ethernet (LAN)

- Realtek RTL8110SC 10/100/1000 Mbps PCI Gigabit Ethernet controller
- Fully compliant with IEEE 802.3, IEEE 802.3u and IEEE 802.3ab

Onboard Video Graphics Array (VGA)

- Integrated in AMD LX800 (Processor)
- Up to 254 MB Video RAM (SMA)
- Cathode ray tube (CRT) and low voltage differential signaling (LVDS) LCD flatpanel interfaces

Audio

- 16 bit full duplex AC'97 Rev. 2.3 compatible audio codec
- Supports Line Out, Line In and Microphone input

Award BIOS, 512 kB Flash BIOS

NV-EEPROM for CMOS Setup Retention without Battery

PS/2 Keyboard Controller

PS/2 Mouse Controller

Watchdog timer (WDT)

Real-time Clock (requires battery)

Digital I/O

- Four Inputs and four Outputs, 5V signal level

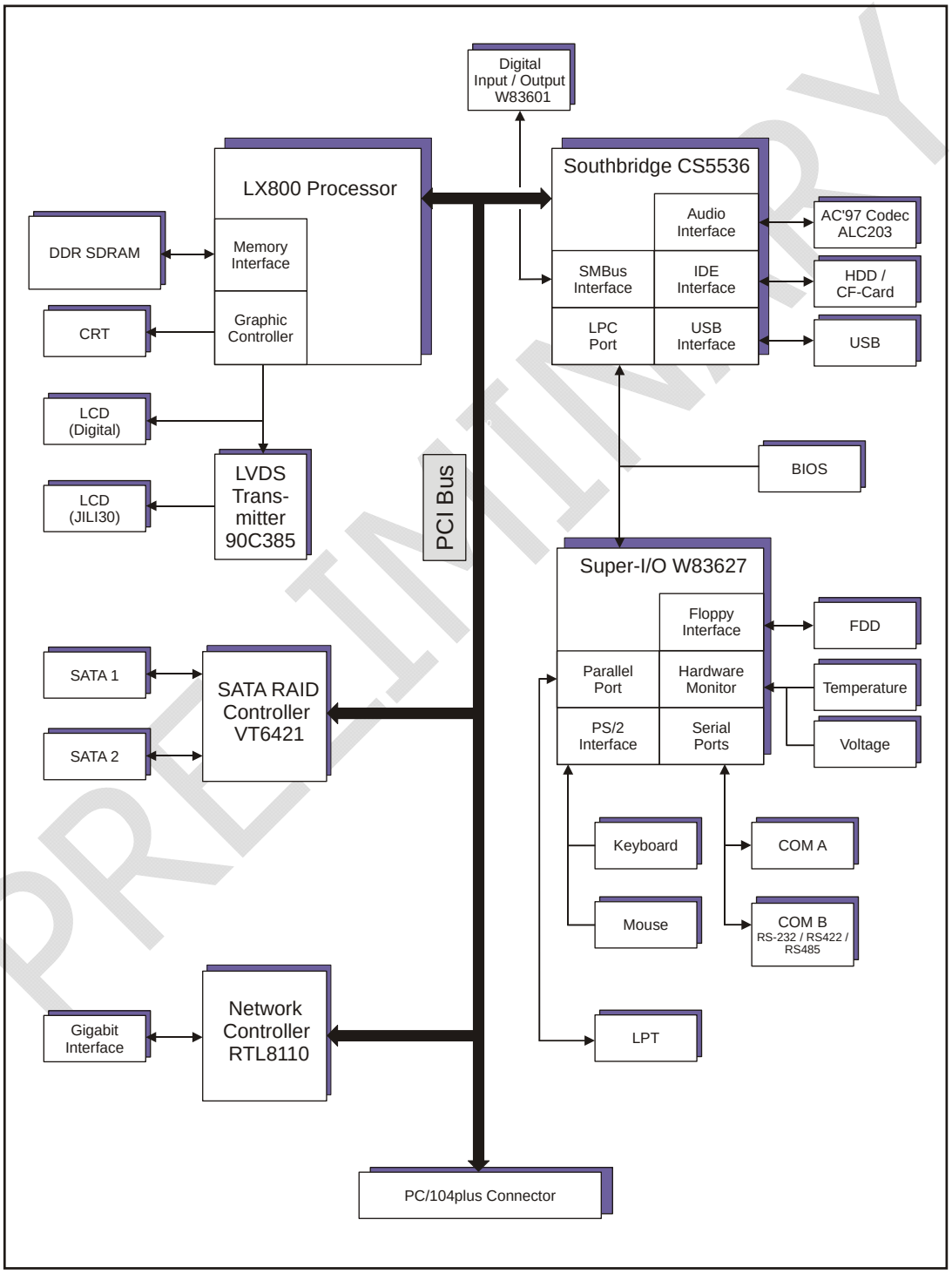
External PCI Bus

- 33 MHz PCI clock
- Only 3.3V PCI cards supported

PRELIMINARY

4.2 Block Diagram

JRex*plus* LX



4.3 Mechanical Specifications

4.3.1 Module Dimensions

➤ 102 x 147 mm (4.0" x 5,8")

4.3.2 Height on Top

➤ Maximum approx. 16.5 mm

4.3.3 Height on Bottom

➤ Maximum approx. 6 mm

PRELIMINARY

4.4 Electrical Specifications

4.4.1 Supply Voltage

The power supply connector (4 pins) requires +5V and +12V (optionally). The additional ATX supplement connector (2 pins) requires +5V standby.

- +5V DC ±5%
- +12V DC ±5% (optionally)
- +5V DC standby ±5% (optionally)

4.4.2 Supply Voltage Ripple

- 100 mV peak to peak 0 - 20 MHz

4.4.3 Supply Current (typical, DOS prompt)

Power consumption tests were executed during the DOS prompt with keyboard (PS/2), CF card and CRT attached to it. The board were equipped with a 256 MB DDR SDRAM modul (DDR400).

	Normal	Standby	Suspend
Power Consumption CPU freqnency 500 MHz	tbd A tbd W	n.a	n.a

4.4.4 Supply Current (typical, Windows XP SP2)

The tested board were equipped with a mouse (USB), a keyboard (PS/2) and CF card. The Power consumption tests were executed during Windows XP SP2 by using the tool ???. The board were equipped with a 256 MB DDR SDRAM modul (DDR400).

	Normal	Idle	Standby S1	Suspend S3
Power Consumption CPU freqency 500 MHz	tbd A tbd W	tbd A tbd W	tbd A tbd W	tbd A tbd W

Note: *It is difficult to test for all possible applications on the market. There may be an application that draws more power from the CPU than the measured values in the table above. This should be taken into consideration if you are on the limit of the thermal specification. If this is the case improvements to your thermal solution are recommended.*

PRELIMINARY

4.4.5 RTC Battery

- Voltage range: 2.0 V - 3.6 V (typ. 3.0 V)
- Maximum current: 3,5 µA @ 3.0 V

English:
CAUTION ! Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Deutsch:
VORSICHT ! Explosionsgefahr bei unsachgemäßem Austausch der Batterie. Ersatz nur durch den selben oder einen vom Hersteller empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

French:
ATTENTION ! Risque d'explosion avec l'échange inadéquat de la batterie. Remplacement seulement par le même ou un type équivalent recommandé par le producteur. L'évacuation des batteries usagées conformément à des indications du fabricant.

Danish:
ADVARSEL ! Lithiumbatteri – Eksplosionsfare ved fejlagtig Håndtering. Udskifting må kun ske med batteri af samme fabrikant og type. Lever det brugte batteri tilbage til leverand∅ren.

Finnish:
VAROITUS ! Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laltevalmistajan suosittelmaan tyyppiln. Havita kaytetty paristo valmistajan ohjeiden mukaisesti.

Spanish:
Precaución ! Peligro de explosión si la batería se sustituye incorrectamente. Sustituya solamente por el mismo o tipo equivalente recomendado por el fabricante. Disponga las baterías usadas según las instrucciones del fabricante.

The battery of this product is not considered to be accessible by the end user. Therefore the safety instructions are only given in english, german, french, danish, finish and spanish language.

If the battery of this product however is accessible by the end user, it is in the responsibility of the customer to give the corresponding safety instructions in the required language(s).

PRELIMINARY

4.5 Environmental Specifications

4.5.1 Temperature

- Operating (with appropriate airflow): 0 to +60°C *(1)*
- Non operating: -10 to +85°C

Note: *1 The maximum operating temperature is the maximum measurable temperature on any spot on a module's surface. You must maintain the temperature according to the above specification.*

4.5.2 Humidity

- Operating: 10% to 90% (non condensing)
- Non operating: 5% to 95% (non condensing)

4.6 MTBF

The following MTBF (Mean Time Between Failure) values were calculated using a combination of manufacturer's test data, if the data was available, and a Bellcore calculation for the remaining parts. The Bellcore calculation used is "Method 1 Case 1". In that particular method the components are assumed to be operating at a 50% stress level in a 40°C ambient environment and the system is assumed to have not been burned in. Manufacturer's data has been used wherever possible. The manufacturer's data, when used, is specified at 50°C, so in that sense the following results are slightly conservative. The MTBF values shown below are for a 40°C in an office or telecommunications environment. Higher temperatures and other environmental stresses (extreme altitude, vibration, salt water exposure, etc.) lower MTBF values.

- System MTBF (hours) : tbd

Note: *Fans usually shipped with Kontron Embedded Modules GmbH products have 50,000-hour typical operating life. The above estimates assume no fan, but a passive heat sinking arrangement. Estimated RTC battery life (as opposed to battery failures) is not accounted for in the above figures and need to be considered for separately. Battery life depends on both temperature and operating conditions. When the Kontron unit has external power; the only battery drain is from leakage paths.*

PRELIMINARY

5. CPU, Chipset and Super I/O

5.1 CPU

The central processing unit (CPU) is part of the AMD Geode LX Embedded processor with following features:

- Extremly low power dissipation
- MMX and 3Dnow! instruction set
- Two 64 kB on-chip level 1 caches
- 128 kB on-chip level 2 cache

5.2 Chipset

The AMD LX chipset consists of:

- LX800 Embedded Processor (Northbridge)
  - Advanced high-performance 64 bit DDR SDRAM controller
  - Supports standard DDR200 to DDR400 memory types up to 1GB
  - High performance 2D graphics controller
  - Supports up to 1024x768x32 bpp at 60 Hz for TFT interface
  - Hardware VGA
  - PCI 2.2 compliant bus controller
  - 32bit 3.3V PCI interface
  - Advanced system power management support
- CS5536 Companion Chip (Southbridge)
  - 32bit 3.3V PCI interface
  - Four integrated USB controller (OHCI/EHCI)
  - Integrated Enhanced-IDE controller
  - Integrated LPC port controller
  - System Management (SM) bus interface
  - Advanced system power management support
  - Legacy device support (Timer, IRQ and DMA controller)
  - Internal Real-Time clock with CMOS RAM

5.3 Super I/O

The external Super I/O WINBOND W83627EHG offers the following features:

- Integrated keyboard controller with PS/2 mouse support
- Two serial ports and one multi-mode parallel port
- Floppy disk controller

PRELIMINARY

6. System Memory

The JRex*plus* LX uses only 200-pin Small Outline-Dual Inline Memory Modules (SODIMMs). One socket is available for 2.5/2.6 Volt unbuffered DDR200 up to DDR400 Double Data Rate Synchronous Dynamic Random Access Memory (DDR-SDRAM) of up to 1 GB.

The total amount of memory available on the SDRAM module is used for main memory and graphic memory on the JRex*plus* LX. Shared Memory Architecture (SMA) manages the sharing of the system memory between graphic controller and processor. Therefore, the full memory size is not available for software applications. Up to 254 MB of system memory are used as graphic memory.

To find the location of the SDRAM socket on the JRex*plus* LX board, please see the Appendix "Connector Layout".

PRELIMINARY

7. PCI Bus Expansion

A quad-row socket trough-hole connector with a 2 x 2 mm (0.79" x 0.79") pitch implements the standard 32 bit PCI bus signals. The complete PCI bus works with 3.3V signal levels, also $V_{I/O}$ uses the 3.3V voltage.

The PC/104 plus bus is available through the standard connector X2.

A description of signals, including electrical characteristics and timings, is beyond the scope of this document. Please refer to the official PCI bus and PC/104 plus specifications for more details.

Attention: *5V PCI expansion cards can damage the board.*
Four slots are available via the connector X2 (IDSEL, /IRQ), but only three slots are busmaster capable.

To find the location of the PC/104 plus connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

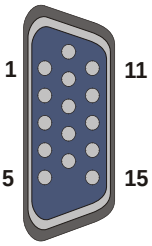
PRELIMINARY

8. Graphics Interface

The graphics accelerator supports CRT monitors and a variety of LCD panels with single clock, color depths of 18/24 bit and resolutions up to QXGA (1920x1080) for CRT and XGA (1024x768) for LCD.

8.1 CRT Connector

The CRT monitor interface is available through the standard DSUB15 connector X7.

Header	Pin	Signal Name	Function
	1	**RED**	Red video signal
	2	**GRN**	Green video signal
	3	**BLU**	Blue video signal
	4	**NC**	Not connected
	5	**GND**	Signal ground
	6	**GND**	Signal ground
	7	**GND**	Signal ground
	8	**GND**	Signal ground
	9	**VCC** *(1)*	Power supply
	10	**GND**	Signal ground
	11	**NC**	Not connected
	12	**NC**	Not connected
	13	**HSYNC**	Horizontal Sync
	14	**VSYNC**	Vertical Sync
	15	**NC**	Not connected

To find the location of the CRT connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

8.2 LCD Panel Connectors

The LVDS interface for the LCD panel is available through the X18 connector (30 pins) on the bottom side of the board. This connector represents the JILI interface (**J**UMPtec **I**ntelligent **L**VDS **I**nterface). The implementation of this subsystem complies with the JILI Specification of Kontron Embedded Modules GmbH. A variety of cables for different display types are available from Kontron. Please refer to the actual cable list on the Kontron Website for part numbers and cable names.

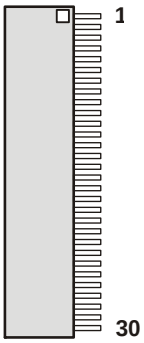
Another option for connecting a display to the JRex*plus* LX is a (LV)TTL compatible 18 bit RGB interface available on X17 (32 pins). A variety of cables for different display types are available from Kontron. Please refer to the actual cable list on the Kontron Website for part numbers and cable names.

PRELIMINARY

When using a LCD Panel, additional voltages may be required to drive the displays logic and to supply the backlight converter. The display logic may require +5V for standard or +3.3V for low-power LCDs. Backlight converters usually are +5V or +12V types. The onboard 3.3V and 5V circuitry of the JRex*plus* LX and the 3.3V or 5V panel logic voltage are share the same voltage regulators.

To find the location of the LCD Panel interface connectors on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

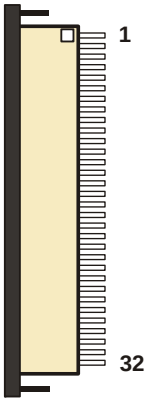
8.2.1 JILI30 Connector

Header	Pin	Signal Name	Function
	1	**FTX0-**	First channel data output 0 (negative)
	2	**FTX0+**	First channel data output 0 (positive)
	3	**FTX1-**	First channel data output 1 (negative)
	4	**FTX1+**	First channel data output 1 (positive)
	5	**FTX2-**	First channel data output 2 (negative)
	6	**FTX2+**	First channel data output 2 (positive)
	7	**GND**	Signal ground
	8	**FTXC-**	First channel clock output (negative)
	9	**FTXC+**	First channel clock output (positive)
	10	**FTX3-**	First channel data output 3 (negative)
	11	**FTX3+**	First channel data output 3 (positive)
	12	**NC**	Not connected
	13	**NC**	Not connected
	14	**GND**	Signal ground
	15	**NC**	Not connected
	16	**NC**	Not connected
	17	**GND**	Signal ground
	18	**NC**	Not connected
	19	**NC**	Not connected
	20	**NC**	Not connected
	21	**NC**	Not connected
	22	**NC**	Not connected
	23	**NC**	Not connected
	24	**GND**	Signal ground
	25	**SDA**	I2C data line
	26	**DATAENA**	Data enable output
	27	**SCL**	I2C clock line
	28 - 30	**VCC** *(1)*	Power supply

Attention: *The JILI30 interface supports only the VESA FPDI standard.*

PREVIEW

8.2.2 18 Bit Digital Connector

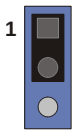
Header	Pin	Signal Name	Function
	1	GND	Signal ground
	2	PCLK	Data shift clock
	3	PHS	Horizontal sync pulse
	4	PVS	Vertical sync pulse
	5	GND	Signal ground
	6	PR0	Red color data line 0
	7	PR1	Red color data line 1
	8	PR2	Red color data line 2
	9	PR3	Red color data line 3
	10	PR4	Red color data line 4
	11	PR5	Red color data line 5
	12	GND	Signal ground
	13	PG0	Green color data line 0
	14	PG1	Green color data line 1
	15	PG2	Green color data line 2
	16	PG3	Green color data line 3
	17	PG4	Green color data line 4
	18	PG5	Green color data line 5
	19	GND	Signal ground
	20	PB0	Blue color data line 0
	21	PB1	Blue color data line 1
	22	PB2	Blue color data line 2
	23	PB3	Blue color data line 3
	24	PB4	Blue color data line 4
	25	PB5	Blue color data line 5
	26	GND	Signal ground
	27	PDE	Data enable
	28 - 29	VCC *(1)*	Power supply
	30	R/L	Rotate image left or right (option)
	31	U/D	Rotate image up or down (option)
	32	NC	Reserved

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

Attention: *Check jumper JP6 (Panel Power) for correct settings for your panel – not doing so might cause permanent damage to your panel.*

8.2.3 18 Bit Digital Jumper Settings

Three jumper JP 3 - JP5 allows a special configuration for pin 30 to 32 of the 18 bit digital connector.



Pins	Signal
1 - 2	VCC
2 - 3	GND

The following table shows the assignment:

Jumper	Digital Connector
JP3	Pin 30
JP4	Pin 32
JP5	Pin 31

8.3 Connecting a LCD Panel

To determine whether your panel display is supported, check the Kontron Website for panel lists. We regularly update the list of panels that have been tested with the JRex*plus* LX.

If you use one of those adapters supplied by Kontron, configuration is easy:

❶ Check whether you have the correct adapter and cable for the panel you plan to use. Inspect the cable for damages. Disconnect the power from your system.

❷ Check Jumper JP6 for correct Panel voltage (Pos. 1-2 = 3.3V 2-3 = 5V).

❸ Check Jumper JP2 for correct Backlight voltage (Pos. 1-2 = 12V 2-3 = 5V).

❹ Check Jumper JP1 for correct Backlight on/off polarity (Pos. 1-2 = High 2-3 = Low).

❺ Connect the cable to the LCD Panel connector X17 or X18 on the JRex*plus* LX and connect the other end to your display.

❻ Connect the backlight converter.

❼ Supply power to your system.

❽ If no image appears on your display, connect a CRT monitor to the CRT connector.

❾ If you still do not see improvement, consider contacting the dealer for technical support.

8.4 Available Video Modes

The following list shows the video modes supported by the graphics controller with maximum frame buffer size. When configured for saller frame buffers and/or using a LCD panel on the JILI interface, not all of the video modes listed below may be available. Capability depends on system configuration and on display capabilities. Different operating systems also may not support all listed modes by the available drivers.

PRELIMINARY

8.4.1 Standard IBM-Compatible VGA Modes

Video Mode	Type	Characters/Pixels	Colors
00h/01h	Text	40x25	16
02h/03h	Text	80x25	16
04h/05h	Graphics	320x200	4
06h	Graphics	640x200	2
07h	Text	80x25	Mono
0Dh	Graphics	320x200	16
0Eh	Graphics	640x200	16
0Fh	Graphics	640x350	Mono
10h	Graphics	640x350	16
11h	Graphics	640x480	2
12h	Graphics	640x480	16
13h	Graphics	320x200	256

8.4.2 Extended VESA VGA Modes

VESA Mode	Type	Pixels	Colors
101h	Graphics	640x480	256
103h	Graphics	800x600	256
105h	Graphics	1024x768	256
107h	Graphics	1280x1024	256
110h	Graphics	640x480	32K
111h	Graphics	640x480	64K
112h	Graphics	640x480	16M
113h	Graphics	800x600	32K
114h	Graphics	800x600	64K
115h	Graphics	800x600	16M
116h	Graphics	1024x768	32K
117h	Graphics	1024x768	64K
118h	Graphics	1024x768	16M
119h	Graphics	1280x1024	32K
11Ah	Graphics	1280x1024	64K
11Bh	Graphics	1280x1024	16M
125h	Graphics	1152x864	256
127h	Graphics	1152x864	64K
128h	Graphics	1152x864	16M
131h	Graphics	1600x1200	256
133h	Graphics	1600x1200	64K
134h	Graphics	1600x1200	16M

PRELIMINARY

8.5 Backlight Connector

Backlight is available through the X19 connector (7 pins). Backlight voltage and Backlight on/off polarity are controlled through the jumper JP1 and JP2.

Header	Pin	Signal Name	Function
	1	**NC**	Not connected
	2	**BKLTADJ**	Brightness control (0V - 5V)
	3	**GND**	Ground
	4	**VCC** *(1)*	5V or 12V power supply
	5	**VCC** *(1)*	5V or 12V power supply
	6	**GND**	Ground
	7	**BKLTON**	Backlight on/off

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of the backlight connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

PRELIMINARY

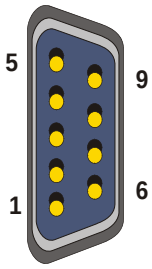
9. Serial-Port Interfaces

Two fully functional serial ports (COMA and COMB) provide asynchronous serial communications. COMA and COMB support RS-232 operation modes. They are 16550 high-speed UART compatible and support 16-byte FIFO buffers for transfer rates from 50 Baud to 115.2 KBaud. A programmable baud rate generator allows transfer rates up to 1.5 MBaud.

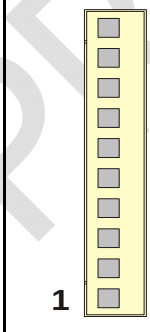
One serial port is available as RS-232 on the JRex front panel, the second serial port COMB can be used as well as RS-422 or RS-485 interface.

9.1 Connector

COMA is available through the standard DSUB9 connector X9 (9 pins).

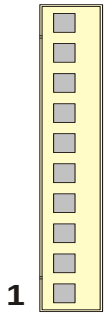
Header	Pin	Signal Name	Function	DSUB-25
	1	/DCD	Data Carrier Detect	8
	2	RXD	Receive Data	3
	3	TXD	Transmit Data	2
	4	/DTR	Data Terminal Ready	20
	5	GND	Signal ground	7
	6	/DSR	Data Set Ready	6
	7	/RTS	Request to Send	4
	8	/CTS	Clear to Send	5
	9	/RI	Ring Indicator	22

COMB is available through the connector X10 (10 pins). A DSUB9 adapter cable is deliverable from Kontron (KAB-DSUB9-3, Part number 96061-0000-00-0).

Header	Pin	Signal Name	Function	DSUB-25	DSUB-9
	1	/DCD	Data Carrier Detect	8	1
	2	/DSR	Data Set Ready	6	6
	3	RXD	Receive Data	3	2
	4	/RTS	Request to Send	4	7
	5	TXD	Transmit Data	2	3
	6	/CTS	Clear to Send	5	8
	7	/DTR	Data Terminal Ready	20	4
	8	/RI	Ring Indicator	22	9
	9	GND	Signal ground	7	5
	10	VCC *(1)*	+5V	--	--

PRELIMINARY

The same connector X10 can be used as a RS-422 or RS-485 interface. The configuration is changeable in the BIOS Setup.

Header	Pin	Signal RS-422	Signal RS-485	Function
 1	1	**TX+**	**TX+ / RX+**	Transmit Data + / Receive Data +
	2	**NC**	**NC**	Not connected
	3	**RX+**	**NC**	Receive Data + / Not connected
	4	**NC**	**NC**	Not connected
	5	**TX-**	**TX- / RX-**	Transmit Data - / Receive Data -
	6	**NC**	**NC**	Not connected
	7	**RX-**	**NC**	Receive Data - / Not connected
	8	**NC**	**NC**	Not connected
	9	**GND**	**GND**	Signal ground
	10	**VCC** *(1)*	**VCC** *(1)*	+5V

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

Attention: *A RS-422/RS-485 terminating resistor is not equipped on the JRexplus LX*

To find the location of the serial port connectors on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

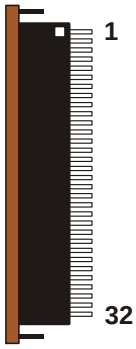
PRELIMINARY

10. Parallel-Port Interface

The JRex*plus* LX incorporates a parallel port that can be set to uni-/bidirectional and supports EPP/ECP operating modes.

10.1 Connector

The parallel port is available through the connector X20 (32 pins). A DSUB25 adapter cable is deliverable from Kontron (KAB-DSUB25-2, Part Number 61033).

Header	Pin	Signal Name	Function	DSUB-25
	1	**VCC** *(1)*	+ 5V	NC
	12	**/AFD**	Autofeed	14
	13	**/STB**	Strobe	1
	14	**/ERR**	Error	15
	15	**D0**	Data 0	2
	16	**/INIT**	Init	16
	18	**D1**	Data 1	3
	19	**/SLIN**	Select in	17
	20	**D2**	Data 2	4
	21	**D3**	Data 3	5
	23	**D4**	Data 4	6
	24	**D5**	Data 5	7
	25	**D6**	Data 6	8
	26	**D7**	Data 7	9
	28	**/ACK**	Acknowledge	10
	29	**/BUSY**	Busy	11
	30	**PE**	Paper out	12
	31	**/SLCT**	Select out	13
	2,11	**GND**	Signal ground	18 - 25
	17,22	**GND**	Signal ground	18 - 25
	27,32	**GND**	Signal ground	18 - 25

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of the parallel port connector on the JRex*plus* LX board, please see the Appendix "Connector Layout".

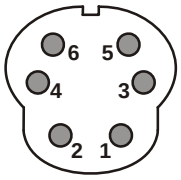
PRELIMINARY

11. PS/2 Keyboard and Mouse Interface

The Super I/O of the JRex*plus* LX supports a PS/2 keyboard and mouse. A PS/2 keyboard can be directly connected to this interface. If you intend to use a PS/2 mouse, connect a Y-cable to this interface. There are many different Y-cables available on the market. Some cables have reverse keyboard/mouse signals. If your keyboard and mouse do not work, connect the keyboard to the mouse side and vice versa.

11.1 Connector

The keyboard/mouse interface is available through the standard miniDIN connector X8 (6 pins).



Pin	Signal Name	Function
1	**KBDAT**	Keyboard data
2	**MSDAT**	Mouse data
3	**GND**	Signal ground
4	**VCC** *(1)*	+5V
5	**KBCLK**	Keyboard clock
6	**MSCLK**	Mouse clock

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of the PS/2 connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

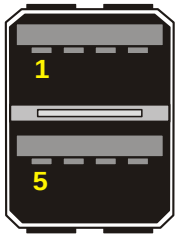
PRELIMINARY

12. USB Interface

The USB interface comes with four USB ports, which follow the OHCI/EHCI specification and are USB 2.0 compliant. You can expand the amount of USB connections by adding external hubs. Two ports are available on a standard connector and two more ports on a pin strip.

12.1 Standard Connector

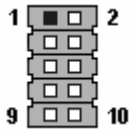
Two USB ports are available through the standard USB connector X12 (8 pins).



Pin	Signal Name	Function
1	**VCC** *(1)*	+5V
2	**USB0-**	USB port 0 (negative)
3	**USB0+**	USB port 0 (positive)
4	**GND**	Signal ground
5	**VCC** *(1)*	+5V
6	**USB1-**	USB port 1 (negative)
7	**USB1+**	USB port 1 (positive)
8	**GND**	Signal ground

12.2 Pin Strip

The another USB ports are available through the standard pin strip connector X13 (10 pins).

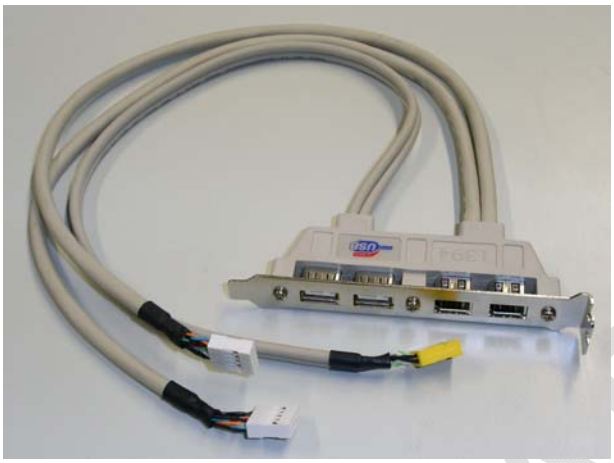


Pin	Signal Name	Function
1	**VCC** *(1)*	+5V
2	**VCC** *(1)*	+5V
3	**USB2-**	USB port 2 (negative)
4	**USB3-**	USB port 3 (negative)
5	**USB2+**	USB port 2 (positive)
6	**USB3+**	USB port 3 (positive)
7	**GND**	Signal ground
8	**GND**	Signal ground
9	**Key (NC)**	Key pin
10	**GND**	Signal ground

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

PRELIMINARY

The following picture shows an example a standard USB/Firewire slot adapter (10 pin USB connector with key).



To find the location of the USB connectors on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

PRELIMINARY

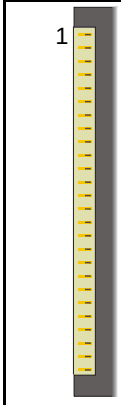
13. Floppy-Drive Interface

The floppy-drive interface of the JRex*plus* LX uses a 2.88 MB Super I/O floppy-disk controller and can support one floppy disk drive with densities that range from 360 kB to 2.88 MB. The controller is 100% IBM compatible.

13.1 Connector

The floppy disk interface is available on the flat-foil connector X3 (26 pins). This type of connector is often internally used in notebooks to connect a slim-line floppy drive.

Accessories are available for this interface from Kontron. To connect a standard 3.5" floppy drive, use an adapter cable (ADA-FLOPPY-2, Part Number 96001-0000-00-0). If you have a slim-line 3.5" floppy drive, you may need a flat foil cable (KAB-FLOPPY/ MOPS-1, Part Number 96019-0000-00-0). It also is possible to get a slim line 3.5" floppy drive with cable from Kontron (FLOPPY-MOPS-1, Part Number 96010-0000-00-0).

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	**VCC** *(1)*	+5V	2	**/IDX**	Index
	3	**VCC** *(1)*	+5V	4	**/DRO**	Drive Select 0
	5	**VCC** *(1)*	+5V	6	**/DSKCHG**	Disk Change
	7	**NC**	Not connected	8	**NC**	Not connected
	9	**NC**	Not connected	10	**/MTRO**	Motor on 0
	11	**NC**	Not connected	12	**/FDIR**	Direction Select
	13	**NC**	Not connected	14	**/STEP**	Step
	15	**GND**	Ground	16	**/WDATA**	Write Data
	17	**GND**	Ground	18	**/WGATE**	Write Gate
	19	**GND**	Ground	20	**/TRK0**	Track 00
	21	**GND**	Ground	22	**/WRTPRT**	Write Protect
	23	**GND**	Ground	24	**/RDATA**	Read Data
	25	**GND**	Ground	26	**/HDSEL**	Side One Select

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of floppy-drive interface on the JRex*plus* LX board, please see the Appendix "Connector Layout".

PRELIMINARY

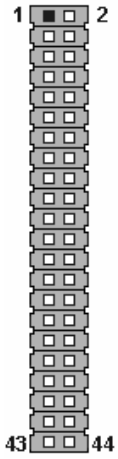
14. EIDE Interface

The JRex*plus* LX features one EIDE interface (Primary channel, UDMA33/66 mode) that can drive two hard disks. When two devices share a single adapter, they are connected in a master/slave, daisy-chain configuration. If only one drive is connected, you must set it as master. Alternatively the same interface can be used for Compact Flash Card applications (switchable as master/slave).

14.1 Connector

The EIDE interface is available through connector X6 (44 pins). This interface is designed in 2mm grid for optimal connectivity to a 2.5" hard disk.

You can use two cables to directly connect a hard disk in a 2.5" form factor (KAB-IDE-2MM, Part Number 96021-0000-00-0) or a 3.5" form factor (KAB-IDE-25, Part Number 96020-0000-00-0).

Header	Pin	Signal Name	Function	Pin	Signal Name	Function
	1	**/RESET**	Reset	2	**GND**	Signal ground
	3	**D7**	Data 7	4	**D8**	Data 8
	5	**D6**	Data 6	6	**D9**	Data 9
	7	**D5**	Data 5	8	**D10**	Data 10
	9	**D4**	Data 4	10	**D11**	Data 11
	11	**D3**	Data 3	12	**D12**	Data 12
	13	**D2**	Data 2	14	**D13**	Data 13
	15	**D1**	Data 1	16	**D14**	Data 14
	17	**D0**	Data 0	18	**D15**	Data 15
	19	**GND**	Signal ground	20	**Key (NC)**	Key pin
	21	**DRQ**	DMA request	22	**GND**	Signal ground
	23	**/IOW**	I/O write	24	**GND**	Signal ground
	25	**/IOR**	I/O read	26	**GND**	Signal ground
	27	**IOCHRDY**	I/O channel ready	28	**CSEL** *(2)*	Cable select
	29	**/DACK**	DMA acknowledge	30	**GND**	Signal ground
	31	**IRQ**	Interrupt	32	**NC**	Not connected
	33	**SA1**	Address 1	34	**ATAD**	UDMA detection
	35	**SA0**	Address 0	36	**SA2**	Address 2
	37	**/CS1**	Chip select 1	38	**/CS3**	Chip select 3
	39	**ACT**	Drive activity	40	**GND**	Signal ground
	41	**VCC** *(1)*	+5V	42	**VCC** *(1)*	+5V
	43	**GND**	Signal ground	44	**NC**	Not connected

PRELIMINARY

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.
2 Pin 28 is connected with 470Ω to Ground for Cable Select IDE devices.

To find the location of EIDE interface on the JRex*plus* LX board, please see the Appendix "Connector Lay-out".

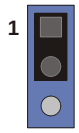
14.2 Compact Flash Card Interface

The same primary IDE channel is realized as a CF-Card interface, also capable of UDMA. The interface has jumper options to be either a master or slave device. If for example the Compact Flash Card is set to master only a slave device can be connected to the 44pin IDE connector.

The CF-Card interface is available through the standard CF-connector X21 (50 pins).

Pin	Signal Name	Function	Pin	Signal Name	Function
1	**GND**	Signal ground	2	**D3**	Data 3
3	**D4**	Data 4	4	**D5**	Data 5
5	**D6**	Data 6	6	**D7**	Data 7
7	**/CS1**	Chip select 1	8	**GND**	Signal ground
9	**GND**	Signal ground	10	**GND**	Signal ground
11	**GND**	Signal ground	12	**GND**	Signal ground
13	**VCC** *(1)*	+5V	14	**GND**	Signal ground
15	**GND**	Signal ground	16	**GND**	Signal ground
17	**GND**	Signal ground	18	**SA2**	Address 2
19	**SA1**	Address 1	20	**SA0**	Address 0
21	**D0**	Data 0	22	**D1**	Data 1
23	**D2**	Data 2	24	**NC**	Not connected
25	**GND**	Signal ground	26	**GND**	Signal ground
27	**D11**	Data 11	28	**D12**	Data 12
29	**D13**	Data 13	30	**D14**	Data 14
31	**D15**	Data 15	32	**/CS3**	Chip select 3
33	**GND**	Signal ground	34	**/IOR**	I/O read
35	**/IOW**	I/O write	36	**VCC** *(1)*	+5V
37	**IRQ**	Interrupt	38	**VCC** *(1)*	+5V
39	**GND**	Signal ground	40	**NC**	Not connected
41	**/RESET**	Reset	42	**IOCHRDY**	I/O channel ready
43	**/DRQ**	DMA request	44	**/DACK**	DMA acknowledge
45	**ACT**	Drive activity	46	**NC**	Not connected
47	**D8**	Data 8	48	**D9**	Data 9
49	**D10**	Data 10	50	**GND**	Signal ground

Jumper JP 7 allows the configuration for master/slave mode.



Pins	Signal
1 - 2	Master
2 - 3	Slave

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

Warning: *Inserting or removing the Compact Flash Card while in operation can cause serious damage and must be avoided.*

To find the location of CF-Card socket on the JRex*plus* LX board, please see the Appendix “Connector Lay-out”.

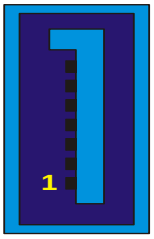
PRELIMINARY

15. SATA Interface

The JRex*plus* LX has realized two SATA ports. Serial ATA connections boost the data rate theoratically up to 150 MB/sec. In addition, it changes the parallel interface requiring 40 separate wires to a serial interface requiring only 6 wires. A RAID (Redundant Array of Independent Disks) configuration is possible.

15.1 Connector

The SATA interface is available through the standard L-type connectors X4 and X5 (7 pins).



Pin	Signal Name	Function
1	**GND**	
2	**TX+**	Transmit (positive)
3	**TX-**	Transmit (negative)
4	**GND**	
5	**RX-**	Receive (negative)
6	**RX+**	Receive (positive)
7	**GND**	

To find the location of the SATA connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

PRELIMINARY

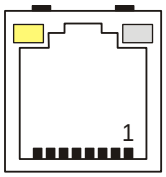
16. Ethernet Controller

The JRex*plux* LX uses the Realtek RTL8110SC Gigabit PCI LAN controller. The network controller support 10/100/1000 Base-T interfaces. The device auto-negotiate the use of a 10, 100 or 1000 MBit/sec connection.

Additionally it is possible to enable the LAN PXE Boot in the BIOS Setup to allow the system to boot up via a network connection from a PXE server.

16.1 Connector

The Ethernet interface is available through the standard RJ45 connector X11 (8 pins).

	Pin	Signal Name	Function
	1	**TXD+ / BI_D1+**	10/100 transmit / 1000 pair 1 (positive)
	2	**TXD- / BI_D1-**	10/100 transmit / 1000 pair 1 (negative)
	3	**RXD+ / BI_D2+**	10/100 receive / 1000 pair 2 (positive)
	4	**BI_D3+**	1000 pair 3 (positive)
	5	**BI_D3-**	1000 pair 3 (negative)
	6	**RXD- / BI_D2-**	10/100 receive / 1000 pair 2 (negative)
	7	**BI_D4+**	1000 pair 4 (positive)
	8	**BI_D4-**	1000 pair 4 (negative)

To find the location of the Ethernet connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

PRELIMINARY

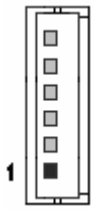
17. Audio Interface

The JRex*plus* LX supports an AC'97 V2.3 audio codec with 16 bit resolution. The interface includes LINE OUT, LINE IN and MICROPHONE IN.

The AC'97 specification provides low cost, high quality sound. This is done by embedding half of the required technology in the Southbridge and the other half in a separate chip from an OEM supplier.

17.1 Connector

The audio interface is available through the connector X14 (6 pins).



Pin	Signal Name	Function
1	**LINE_OUT_R**	Line output right
2	**GND**	Signal ground
3	**LINE_OUT_L**	Line output left
4	**LINE_IN_R**	Line input right
5	**MIC_IN**	Microphone input
6	**LINE_IN_L**	Line input left

To find the location of the audio connector on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

PRELIMINARY

18. Digital Interface

The JRex*plus* LX features four digital inputs and four digital outputs. All inputs/outputs are TTL compatible.

18.1 Electrical Specifications

18.1.1 Digital Inputs

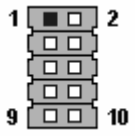
Parameter	Min.	Typ.	Max.	Units
Input LOW voltage			0.8	V
Input HIGH voltage	2.0		5.25	V

18.1.2 Digital Outputs

Parameter	Min.	Typ.	Max.	Units
Output LOW voltage			0.55	V
Output HIGH voltage	2.4		5.0	V
Output HIGH current			12	mA

18.2 Connector

The digital interface is available through the connector X15 (10 pins).



Pin	Signal Name	Function
1	**OUT1**	Digital output 1
2	**IN1**	Digital input 1
3	**OUT2**	Digital output 2
4	**IN2**	Digital input 2
5	**OUT3**	Digital output 3
6	**IN3**	Digital input 3
7	**OUT4**	Digital output 4
8	**IN4**	Digital input 4
9	**VCC** *(1)*	+5V
10	**GND**	Signal ground

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of the digital interface connector on the JRex*plus* LX board, please see the Appendix "Connector Layout".

PRELIMINARY

19. Power Supply

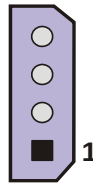
The JRex*plus* LX supports two power supply modes: **AT** and **ATX**.

AT mode: Only one connector (4 pins) is required. After switching on the supply voltage a circuit generates a reset and the board immediately begins to work. Disadvantage: Power states S3 and S5 are consuming more current.

ATX mode: Two connectors (4 pins and 2 pins) are required. After switching on the supply voltage the board is then immediately ready to operate, though only on standby power. When the power button is pressed the remaining supply voltages are connected and the board begins to work.

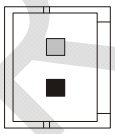
19.1 Main Power Connector (AT/ATX)

The main power connector is available as X22 (4 pins).

Header	Pin	Signal Name	Function
	1	**VDD** *(1)*	+12V
	2	**GND**	Ground
	3	**GND**	Ground
	4	**VCC** *(1)*	+5V

19.2 Power Connector Supplement (ATX)

The power connector supplement is available as X23 (2 pins).

Header	Pin	Signal Name	Function
	1	**/PS_ON**	Power supply on
	2	**5VSB** *(1)*	+5V standby voltage

Note: *1 To protect the external power lines of peripheral devices, make sure that*
- the wires have the right diameter to withstand the maximum available current.
- to enclosure of the peripheral device fulfills the fire-protecting conditions of IEC/EN 60950.

To find the location of the power connectors on the JRex*plus* LX board, please see the Appendix "Connector Layout".

PRELIMINARY

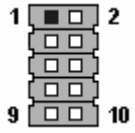
19.3 Power Pins

Every power pin on the power connector supplement is limited to a maximum current and the following limitations apply:

Power	Number of Pins	Max. Current
5VSB	1	1A

19.4 Power Front Panel Pins

The power button and other power signals are available through the pin strap FP2 (10 pins).



Pin	Signal Name	Function
1	**PWR_LED+**	Power LED (positive)
2	**PWR_BTN+**	Power button (positive)
3	**NC**	Not connected
4	**PWR_BTN-**	Power button (negative)
5	**PWR_LED-**	Power LED (negative)
6	**NC**	Not connected
7	**KBD_LOCK**	Keyboard lock
8	**RSVD**	Reserved
9	**GND**	Signal ground
10	**RSVD**	Reserved

To find the location of the Power Front Panel Pins on the JRex*plus* LX board, please see the Appendix “Connector Layout”.

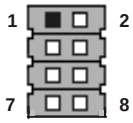
PRELIMINARY

20. Common Front Panel Pins

The Common Front Panel provides some special functions (e.g. Reset button and Speaker).

20.1 Pin Strap

The Common Front Panel is available through the pin strap FP1 (8 pins).

Header	Pin	Signal Name	Function
	1	**RST_BTN+**	Reset button (positive)
	2	**SPKR+**	Speaker (positive)
	3	**RST_BTN-**	Reset button (negative)
	4	**NC**	Not connected
	5	**HDD_LED+**	Hard Drive LED (positive)
	6	**NC**	Not connected
	7	**HDD_LED-**	Hard Drive LED (negative)
	8	**SPKR-**	Speaker (negative)

To find the location of the Common Front Panel Pins on the JRex*plus* LX board, please see the Appendix "Connector Layout".

PRELIMINARY

21. Watchdog Timer

The watchdog timer (WDT) is integrated in the Winbond W83627 Super I/O of the JRex*plus* LX and can issue a reset to the system. The watchdog timer circuit has to be triggered within a specified time by the application software. If the watchdog timer is not triggered because proper software execution fails or a hardware malfunction occurs, it resets the system.

21.1 Configuration

You can set the watchdog timer to Disabled or Reset. You can specify the delay time and the time-out (trigger period) from 1 second to 30 minutes. The delay time is the time after first initialization before the trigger period starts. The timeout is the time the watchdog timer has to be triggered within. You can make the initialization settings in the BIOS Setup.

21.2 Programming

21.2.1 Initialization

You can initialize the watchdog timer from the BIOS Setup. You also can set up the initialization from the application software with help of the JIDA (**J**umptec **I**ntelligent **D**evice **A**rchitecture) programmer's interface.

21.2.2 Trigger

The watchdog needs to be triggered out of the application software within a specified timeout period. You can only do this in the application software by using low-level programming or with help of the JIDA programmer's interface.

For information about the JIDA programmer's interface refer to the JIDA software packages on the Kontron Website.

PRELIMINARY

22. Hardware Monitor

The Winbond W83627 Super I/O monitors several critical hardware parameters of the system, including power supply voltages and CPU temperature, which are very important for a high-end computer system to remain stable and function properly.

The following parameters are monitored:

- CPU core voltage
- +2.5V (board voltage)
- +3.3V (board voltage)
- +5V standby voltage
- +5V (system voltage)
- +12V (system voltage)
- CPU temperature with on-die diode
- System temperature

22.1 Configuration

You can use the PC Health Status submenu in the BIOS Setup utility to obtain information on voltages and to check the temperature of the CPU die.

To monitor the parameters of this feature from your operating system, Kontron recommends that you use the 32-bit protected mode **J**UMPtec's **I**ntelligent **D**evice **A**rchitecture driver (JIDA32) with the test and demo application for Windows 95/98/ME/NT/2000/XP, which is available on the KONTRON Website

PRELIMINARY

23. Onboard Device Configuration

Many of the onboard devices offer several configuration settings in the System BIOS Setup. Refer to chapter SETUP GUIDE for more configuration information.

Onboard Device	see Main menu / Sub menu
Graphics Interface	Advanced Chipset Features / Video Memory Size Advanced Chipset Features / Output Display Advanced Chipset Features / LCD Resolution Advanced Chipset Features / Backlight Value PnP-PCI Configurations / Init Display First
CPU/Memory Interface	Advanced Chipset Features / CPU Frequency Advanced Chipset Features / Memory Speed
Serial Port Interfaces	Integrated Peripherals / Onboard Serial Port 1 Integrated Peripherals / Onboard Serial Port 2 Integrated Peripherals / UART2 Transmission Type
Parallel Port Interface	Integrated Peripherals / Onboard Parallel Port Integrated Peripherals / Parallel Port Mode Integrated Peripherals / EPP Mode Select Integrated Peripherals / ECP Mode Use DMA
PS/2 Keyboard Interface	Advanced BIOS Features / Boot Up Numlock Status Advanced BIOS Features / Gate A20 Option Advanced BIOS Features / Typematic Rate Setting Advanced BIOS Features / Typematic Rate Advanced BIOS Features / Typematic Delay
PS/2 Mouse Interface	Advanced BIOS Features / PS2 Mouse Function
USB Interface	Advanced Chipset Features / USB Controller Advanced Chipset Features / EHCI Controller Advanced BIOS Features / First Boot Device Advanced BIOS Features / Second Boot Device Advanced BIOS Features / Third Boot Device
Network Interface	Advanced Chipset Features / LAN Controller Advanced Chipset Features / PXE LAN Boot Advanced BIOS Features / First Boot Device Advanced BIOS Features / Second Boot Device Advanced BIOS Features / Third Boot Device
Audio Interface	Advanced Chipset Features / Audio Controller
Floppy Drive Interface	Standard CMOS Features / Drive A Advanced BIOS Features / First Boot Device Advanced BIOS Features / Second Boot Device Advanced BIOS Features / Third Boot Device Integrated Peripherals / Onboard FDC Controller
Temperature Monitoring	PC Health Status / Shutdown Temperature

IDE Interface	Standard CMOS Features / IDE Primary Master Standard CMOS Features / IDE Primary Slave Advanced BIOS Features / Hard Disk Boot Priority Advanced BIOS Features / Virus Warning Advanced BIOS Features / First Boot Device Advanced BIOS Features / Second Boot Device Advanced BIOS Features / Third Boot Device Advanced BIOS Features / Boot Other Device Integrated Peripherals / IDE Controller Integrated Peripherals / Master Drive PIO Mode Integrated Peripherals / Slave Drive PIO Mode Integrated Peripherals / IDE Primary Master UDMA Integrated Peripherals / IDE Primary Slave UDMA Integrated Peripherals / IDE Bus Master Mode Integrated Peripherals / IDE HDD Block Mode
Watchdog Timer	Advanced Chipset Features / Watchdog Mode Advanced Chipset Features / Watchdog Timeout Advanced Chipset Features / Watchdog Delay
BIOS Extensions	Advanced BIOS Features / JRC Extension Advanced BIOS Features / Darkboot - Custom Logo
Power Management	Power Management Setup / Power Management Power Management Setup / ACPI Suspend Type Power Management Setup / IRQ Wakeup Events
Miscellaneous	Advanced BIOS Features / Security Option Advanced Chipset Features / Security Block PnP-PCI Configurations / Reset Configuration Data PnP-PCI Configurations / Resources Controlled By PnP-PCI Configurations / IRQ Resources PnP-PCI Configurations / Memory Resources

PRE

24. Setup Guide

The PHOENIX/AWARD BIOS Setup Utility changes system behavior by modifying the BIOS configuration. The setup program uses a number of menus to make changes and turn features on or off.

Whenever you contact technical support about BIOS issues, providing a BIOS version <BLX8R???> is especially helpful.

24.1 Start PHOENIX/AWARD BIOS Setup Utility

To start the PHOENIX/AWARD BIOS Setup Utility, press the **<DEL>** key when the following string appears during boot up.

```
Press <DEL> to enter Setup
```

The Main Menu then appears.

24.2 General Information

The **Setup Screen** is composed of several sections:

Setup Screen	Location	Function
Menu Bar	Upper Half	Lists and selects all top-level menus.
Legend Bar	Near Bottom or Bottom	Lists setup navigation keys.
Item Specific Help Window	Bottom or Left Side	Help for selected item.

Menu Bar

The menu bar at the upper half of the window lists different menus. Use the left/right/up/down arrow keys to make a selection.

Legend Bar

Use the keys listed in the legend bar on the bottom to make your selections or exit the current menu.

Note: *In the Option column,* ***bold*** *shows default settings.*

PRELIMINARY

24.3 Main Menu

Feature	Description
Standard CMOS Features	Defines Time, Date, Harddisk and Floppy Type
Advanced BIOS Features	Defines Virus Warning, Boot Sequence, Keyboard and Mouse Parameters
Advanced Chipset Features	Defines Clocks, Video Settings, LAN, USB and Watchdog Features
Integrated Peripherals	Defines IDE Global Settings and Onboard Devices (COM, LPT)
PnP/PCI Configuration	Defines Graphic Boot Device and PCI/Memory Resources
Power Management Setup	Defines ACPI Suspend Types and Wakeup Events
PC Health Status	Shows Temperatures/Voltages and defines Shutdown Temperature
Display Board Information	Shows BIOS Version/Date, Serial Number and others
Load Fail-Safe Defaults	Overwrite Setup Values with Fail-Safe Values
Load Optimized Defaults	Overwrite Setup Values with Optimized Values
Set Supervisor Password	Change, Set or Disable Supervisor Password
Set User Password	Change, Set or Disable User Password
Save & Exit Setup	Saves Setup Values to CMOS and Exit Setup
Exit Without Saving	Discards all Setup Values and Exit Setup

24.4 Standard CMOS Features

Feature	Option	Description
Date	MM/DD/YYYY	Sets system date
Time	HH:MM:SS	Sets system time
▸ IDE Primary Master	Autodetected drive	Displays result of IDE autotyping
▸ IDE Primary Slave	Autodetected drive	Displays result of IDE autotyping
Drive A	**None**, 360 kBits 5¼ “ 1.2 MBits 5¼ “, 720 kBits 3½ “ 1.44 MBits 3½ “, 2.88 MBits 3½ “	Sets type of floppy disk drive
Halt On	All Errors, No Errors **All, But Keyboard** All, But Diskette All, But Disk/Key	Determines if errors detected during boot-up cause system to halt.
Base Memory	N/A	Displays amount of conventional memory detected during boot-up
Extended Memory	N/A	Displays amount of extended memory detected during boot-up Extended memory = capacity of memory module – selected frame buffer memory size
Total Memory	N/A	Displays amount of total memory detected during boot-up

24.4.1 IDE Master or Slave Submenu

Feature	Option	Description
IDE HDD Auto-Detection	Press Enter	Executes HDD Auto-Detection
IDE Primary Master/Slave	None **Auto** Manuell	None = disable drive Auto = Auto-Detection, the drive itself supplies the information Manuell = end user supplies the HDD information
Access Mode	CHS LBA Large **Auto**	CHS = physically 28bit addressing mode LBA = adressing mode with logical block numbers Large = for drives that do not support LBA and have more than 1024 cylinders Auto = Auto-Detection, the drive itself supplies the information
Capacity	N/A	Displays the calculated size of the drive
Cylinder	N/A	Number of cylinders
Head	N/A	Number of read/write heads
Precomp	N/A	Write precompensation cylinder number
Landing Zone	N/A	Defines the head park position
Sector	N/A	Number of sectors per track

24.5 Advanced BIOS Features

Feature	Option	Description
▸ Hard Disk Boot Priority	Press Enter	Selects Hard Disk boot device order
Virus Warning	Enabled **Disabled**	Enables or disables the virus warning for IDE hard-disk boot sector
First Boot Device Second Boot Device Third Boot Device	Floppy **Hard Disk (Third)** **CDROM (Second)** **USB-FDD (First)** USB-CDROM LAN Disabled	Standard legacy diskette drive Primary IDE hard drive Standard CDROM or DVD drive USB diskette drive USB CDROM drive Network controller with LAN-Boot-ROM Disables boot device
Boot Other Device	Disabled **Enabled**	
Security Option	**Setup** System	Setup = Password required for Setup System = Password required for system boot-up
JRC Extension	**Enabled** Disabled	Enables or disables the JRC extension (Remote Control)
Darkboot / Custom Logo	**Disabled** Enabled	If enabled, normally Darkboot will be active. For Custom Logo contact Kontron
Boot Up Numlock Status	Off **On**	On or Off turns NumLock on or off at boot-up (keyboard feature)

Feature	Option	Description
Gate A20 Option	Normal **Fast**	Normal = a pin in the keyboard controller checks GateA20 Fast = lets chipset controls GateA20
Typematic Rate Setting	**Disabled** Enabled	Enables or disables manual adjustability
Typematic Rate	**6**, 8, 10, 12, 15,20, 24, 30 chars/sec.	Sets number of times to repeat a keystroke per second if you hold the key down
Typematic Delay	**250**, 500, 750, 1000 ms	Sets delay time after key is held down before it begins to repeat the keystroke
PS/2 Mouse Function	**Disabled** Enabled	Disabled prevents installed PS/2 mouse from functioning but frees IRQ12 Enabled forces the PS/2 mouse port to be enabled regardless if a mouse is present

24.6 Advanced Chipset Features

Feature	Option	Description
CPU Frequency	200 MHz 333 MHz, 400 MHz 433 MHz, **500 MHz**	Selects CPU frequency
Memory Speed	DDR200, **DDR266** DDR333, DDR400	Selects memory speed
Video Memory Size	**8**, 16, 32, 64, 128, 254 MB	Defines Video memory size. Video memory shares system memory
Output Display	**CRT**, LCD LCD & CRT	Selects display boot devices. CRT & LCD is the simultaneous mode
LCD Resolution	VGA, SVGA, **XGA**	VGA, SVGA and XGA provides standard timings for LCD panel resolutions
Backlight Value	0, 10, 20, 30, **40**, 50 60, 70, 80, 100, 120 150, 180, 210, 230, 250	Chooses a value to adjust backlight of the LCD 0 = 0 V 250 = nearly maximal voltage
LAN Controller	Disabled, **Enabled**	Enables or disables the PCI Network controller
PXE LAN Boot	Enabled, **Disabled**	Enables or disables the PXE LAN Boot feature
Audio Controller	**Enabled**, Disabled	Enables or disables the internal Audio controller
USB Controller	**Enabled**, Disabled	Enables or disables the internal USB controller (including the EHCI controller)
EHCI Controller	**Enabled**, Disabled	Enables or disables the internal EHCI controller (USB 2.0)
Security Block	**Disabled**, Enabled	Enables or disables the internal Security Block

24.7 Integrated Peripherals

Feature	Option	Description
IDE Controller	**Enabled** Disabled	Enables or disables the internal IDE controller
Master/Slave Drive PIO Mode	**Auto**, Mode 0 Mode 1, Mode 2 Mode 3, Mode 4	Selects HDD PIO mode or Auto for optimum transfer mode
IDE Primary Master/Slave UDMA	Disabled **Auto**	Disables UDMA or selects the optimum transfer mode
IDE Bus Master Mode	Disabled **Enabled**	Enables or disables IDE bus master mode
IDE HDD Block Mode	Disabled **Enabled**	Enables or disables IDE block mode. If the Hard Drive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector
Onboard FDC Controller	Disabled **Enabled**	Enables or disables onboard FDC controller
Onboard Serial Port 1/2	Disabled **3F8/IRQ4 (Port 1)** **2F8/IRQ3 (Port 2)** 3E8/IRQ4 2E8/IRQ3	Selects I/O base and IRQ of serial port respectively disables the port
UART2 Transmission Type	**RS-232** RS-422 RS-485	The second serial port supports three different interfaces RS-422 = four wire differential interface RS-485 = two wire differential interface
Onboard Parallel Port	Disabled **378/IRQ7** 278/IRQ5 3BC/IRQ7	Selects I/O base and IRQ of serial port respectively disables the port
Parallel Port Mode	**Standard**, EPP ECP, ECP+EPP	Sets the mode for parallel port Standard = bidirectional EPP = Enhanced Parallel Port specification ECP = Extended Capabilities Port specification
EPP Mode Select	**EPP1.9** EPP1.7	Selects the EPP specification
ECP Mode Use DMA	1 **3**	Selects the DMA channel for ECP specification

24.8 PnP/PCI Configurations

Feature	Option	Description
Init Display First	**PCI Slot** Onboard	Defines the search strategy for the primary graphic controller
Reset Configuration Data	**Disabled** Enabled	Enabled erases all configuration data in Extended System Configuration Data (ESCD), which stores the configuration settings for plug-in devices
Resources Controlled by	**Auto(ESCD)** Manual	Selects Auto the system BIOS configure all PnP data Manual allows user configuration of PCI IRQs and memory ranges
▸ IRQ Resources	Press Enter	Defines the assignment of PCI interrupts
▸ Memory Resources	Press Enter	Allocates a memory area for peripherals that requires high memory

24.8.1 IRQ Resources

Feature	Option	Description
IRQ3, IRQ4 IRQ5, IRQ7 IRQ10, IRQ11 IRQ12 assigned to	**PCI Device** Reserved	Reserves the specified IRQ for usage by legacy devices (excludes the interrupt for PCI usage) Serial and parallel ports will be automatically taken into account

24.8.2 Memory Resources

Feature	Option	Description
Reserved Memory Base	**N/A**, C800, CC00 D000, D400 D800, DC00	Selects the base segment address of memory area
Reserved Memory Length	**8K**, 16K 32K, 64K	Selects the length of memory area (in kByte)

PRELIMINARY

24.9 Power Management Setup

Feature	Option	Description
Power Management	Disabled **ACPI**	Enables or disables the ACPI power management
ACPI Suspend Type	**S1 (POS)** S3 (STR)	Selects >Power On Standby< (S1) or >Suspend To Ram< (S3)
▸ IRQ Wakeup Events	Press Enter	Defines the Power On Standby (S1) Wakeup Events

24.9.1 IRQ Wakeup Events

Feature	Option	Description
IRQ1 (Keyboard) IRQ3 (COM2) IRQ4 (COM1)	**Off (IRQ3, IRQ4)** **On (IRQ1)**	Enables or disables the wakeup option

24.10 PC Health Status

Feature	Option	Description
Shutdown Temperature	**Disabled** 60°C / 140°F 65°C / 149°F 70°C / 158°F	Defines the shutdown temperature
System Temperature	N/A	Local temperature
CPU Temperature	N/A	Temperature of CPU Die
Board Voltage +Vcore	N/A	+Vcore voltage (generated onboard)
Board Voltage +2.5V	N/A	+2.5V voltage (generated onboard)
Board Voltage +3.3V	N/A	+3.3V voltage (generated onboard)
Board Voltage +5Vsb	N/A	+5V standby voltage (external or onboard)
System Voltage +5V	N/A	+5V voltage (external power supply)
System Voltage +12V	N/A	+12V voltage (external power supply)

PRELIMINARY

24.11 Display Board Information

Feature	Option	Description
BIOS Version	N/A	Shows the actual BIOS version
BIOS Date	N/A	Shows the BIOS production date
LX800 Chip Rev.	N/A	Shows the Northbridge (LX800) chip revision
CS5536 Chip Rev.	N/A	Shows the Southbridge (CS5536) chip revision
Board Class	N/A	Shows the KONTRON specific board class (JIDA entry)
Board Name	N/A	Shows the KONTRON specific board name (JIDA entry)
Hardware Version	N/A	Shows the KONTRON specific hardware version (JIDA entry)
Manufacturing Date	N/A	Shows the KONTRON specific manufacturing date (JIDA entry)
Serial Number	N/A	Shows the KONTRON specific serial number (JIDA entry)
Boot Counter	N/A	Shows the actual boot counter

PRELIMINARY

24.12 Kontron BIOS Extensions

Besides the PHOENIX/AWARD System BIOS, the JRex*plus* LX comes with a few BIOS extensions that support special features. All extensions are located in the onboard Flash. Some extensions are permanently available; some are loaded if required during boot-up.

Supported features include:

- JIDA standard
- Remote Control feature (JRC)
- Onboard LAN PXE ROM

All enabled BIOS extensions require shadow RAM. However, if the system memory cannot find free memory space because all the memory is already used for add-on peripherals, the BIOS extensions do not load.

24.12.1 JIDA BIOS Extension

The **J**UMPtec **I**ntelligent **D**evice **A**rchitecture (JIDA) interface is integrated into the BIOS of the JRex*plus* LX board. This interface enables hardware-independent access to features that cannot be accessed via standard APIs. Functions such as watchdog timer, brightness of LCD backlight and user bytes in the EEPROM can be configured with ease by taking advantage of this standard board feature.

The JIDA BIOS extension is not a true extension BIOS. It is part of the system BIOS and is located in the system BIOS segments after boot-up. It is permanently available and supports the JIDA 16-bit standard and the JIDA 32-bit standard.

The JIDA 16-bit standard is a software interrupt 15h driven interface for programmers and offers lots of board information functions. For detailed information about programming, refer to the JIDA specification and a source code example (JIDAI???.ZIP), which you can find on the Kontron Website. The three question marks represent the revision number of the file. You also can contact technical support for this file.

For other operating systems, special drivers (JIDAIA??.ZIP) are available. You can download the zip file from the Kontron Website.

24.12.2 Remote Control Client Extension

You can remotely control the JRex*plus* LX using software available from Kontron (JRC-1, Part Number 96047-0000-00-0). This software tool can communicate with the board via one of the serial ports. During boot-up, the system BIOS scans the serial ports for an available JRC connection. If detected, it loads the JRC client BIOS extension into the memory. The JRC client is always loaded into the memory location DE000h, a 16K block is shadowed.

For more information on the Remote Control usage, refer to the JRC-1 technical manual or Application Note JRCUsage_E???.PDF, which you can find on the Kontron Website.

PRELIMINARY

24.12.3 LAN PXE ROM

This optionally ROM allows you to boot the JRex*plus* LX over an Ethernet connection. If the onboard LAN PXE ROM is enabled in the system BIOS setup, an optionally ROM for the Ethernet controller loads into memory during boot up. A server with Intel PXE boot support is required on the other side of the Ethernet connection. The setup and configuration of the server, including PXE support, is not the responsibility of Kontron.

PRELIMINARY

Appendix A: System Resourcen

A.1 Interrupt Request (IRQ) Lines

Please ensure that the chosen interrupt is not already in use by PCI devices.

IRQ #	Use	Available	Comment
0	Timer0	No	
1	Keyboard	No	
2	Cascade	No	
3	COM2	No	*Note (1)*
4	COM1	No	*Note (1)*
5	Free	for PCI	Dynamic (BIOS default)
6	FDC	No	*Note (1)*
7	LPT1	No	*Note (1)*
8	RTC	No	
9	ACPI	No	*Note (2)*
10	Free	for PCI	Dynamic (BIOS default)
11	Free	for PCI	Dynamic (BIOS default)
12	PS/2 Mouse	No	*Note (1)*
13	FPU	No	
14	Primary IDE	No	*Note (1)*
15	Secondary IDE	No	*Note (3)*

Note: *1 If the „used for" device is disabled in setup, the corresponding interrupt is available for other devices.*
2 Not available if ACPI is used.
3 Not usable in Windows, since a PCI IDE controller uses always two channels.

PRELIMINARY

A.2 Direct Memory Access (DMA) Channels

DMA #	Used for	Available	Comment
0		Yes	
1	(LPT1)	Yes	*Note (2)*
2	FDC	No	*Note (1)*
3	(LPT1)	Yes	*Note (2)*
4	Cascade	No	
5		No	*Note (3)*
6		No	*Note (3)*
7		No	*Note (3)*

Note: *1 If the „used for" device is disabled in setup, the corresponding interrupt is available for other devices.*
2 Possible setting for LPT1 if configured for ECP mode
3 16 bit DMA channels not available.

PRELIMINARY

A.3 I/O Address Map

The I/O-port addresses of the JRex*plus* LX are functionally identical to a standard PC/AT. All addresses not mentioned in this table should be available. We recommend that you do not use I/O addresses below 0100h with additional hardware for compatibility reasons, even if available.

I/O Address (h)	Use	Available	Comment
0000 - 00FF	DMA Controller, Interrupt Controller, Timer, Keyboard Controller, System Control, Math Coprocessor and other devices	No	Fixed
01F0 - 01F7	Fixed Disk	No	Fixed
0278 - 027F		Yes	Possible address of LPT2
0290 - 0297	Hardware Monitor	No	Fixed
02E8 - 02EF		Yes	Possible address of COM4
02F8 - 02FF	Serial Port 2	No	Default for COM2, free with different configuration
0378 - 037F	Parallel Port 1	No	Default for LPT1; free with different configuration
03BC - 03C4		Yes	Possible address of LPT3
03B0 - 03DF	VGA	No	Fixed
03E8 - 03EF		Yes	Possible address of COM3
03F0 - 03F7	Diskette Controller	No	Free, if device is disabled in setup
03F8 - 03FF	Serial Port 1	No	Default for COM1, free with different configuration
0480 - 048F	DMA Extension	No	Fixed
04D0 - 04D8	PIC Extension	No	Fixed
0CF8 - 0CFF	PCI Configuration	No	Fixed
6000 - 63FF	Reserved	No	Fixed (Default address from AMD PCI ISA-Bridge)
9C00 - 9FFF	Reserved	No	Fixed (Default address from AMD PCI ISA-Bridge)
AC1C - AC1F	Reserved	No	Fixed (Default address from AMD PCI Host Bridge)
F400 - F4FF	Reserved	No	Fixed (Default address from VIA PCI SATA Controller)
F600 - F6FF	Reserved	No	Fixed (Def. address from Realtek PCI Network Contr.)
F900 - F91F	Reserved	No	Fixed (Default address from VIA PCI SATA Controller)
FA00 - FDFF	Reserved	No	Fixed (Default address from VIA PCI SATA Controller)
FE00 - FE7F	Reserved	No	Fixed (Default address from AMD PCI Audio Controller)
FF00 - FF0F	Reserved	No	Fixed (Default address from AMD PCI IDE Controller)

A.4 Memory Map

The JRex*plus* LX can support up to 1 GB memory modules. The first 640 kB of DRAM are used as main memory.

Using DOS, you can address 1 MB of memory directly. Memory area above 1 MB (high memory, extended memory) is accessed under DOS via special drivers such as HIMEM.SYS and EMM386.EXE, which are part of the operating system. Please refer to the operating system documentation or special textbooks for information about HIMEM.SYS and EMM386.EXE.

Other operating systems (Linux or Windows versions) allow you to address the full memory area directly.

Upper Memory	Use	Available	Comment
A0000h – BFFFFh	VGA Memory	No	Mainly used by graphic adapter cards
C0000h – CFFFFh	VGA BIOS	No	Used by onboard extension ROMs. The range C8000h - CFFFFh is free if VGA-BIOS only use 32 kB (e.g. Onboard graphic).
D0000h – DFFFFh		Yes	Free for ISA bus or shadow RAM in standard configurations If onboard LAN PXE ROM is enabled, or JRC is used, a block is shadowed for BIOS extensions, starting with first free area at CC000h or D0000h, D4000h, D8000hor DC000h. (BIOS extensions do not use the whole shadow block). JRC is always starting at DE000h.
E0000h – FFFFFh	System BIOS	No	Fixed

PRELIMINARY

A.5 PCI Devices

All devices follow the Peripheral Component Interconnect 2.2 (PCI 2.2) specification. The BIOS and OS control memory and I/O resources. Please see the PCI 2.2 specification for details.

PCI Device (IDSEL)	PCI IRQ	REQ / GNT	Comment
Onboard Host Bridge	None		Integrated in chipset
Onboard Graphic Controller	INTA#		Integrated in chipset
Onboard ISA Bridge	None		Integrated in chipset
Onboard IDE Controller	None		Integrated in chipset
Onboard USB Controller 1	INTD#		Integrated in chipset
Onboard USB Controller 2	INTD#		Integrated in chipset
Onboard Audio Controller	INTB#		Integrated in chipset
Onboard Encryption Controller	INTA#		Integrated in chipset
Network Controller (AD28)	INTA#	Discrete channel for Network	
SATA Controller (AD29)	INTB#	Discrete channel for SATA	

A.6 SMBus Devices

The JRex*plus* LX uses an onboard System Management (SM) Bus. This bus is not available on an peripheral connector and therefore cannot be used for external SMBus devices.

SMBus Address	SM Device	Comment
30h/31h	GPI/O IC	Winbond I/O Controller W83601
A0h/A1h	SPD EEPROM	Part of the DDR RAM module

Note: *There are more devices connected to the SMBus than listed in this table, but access to these devices in not permitted. Don't access any other device addresses except those listed above.*

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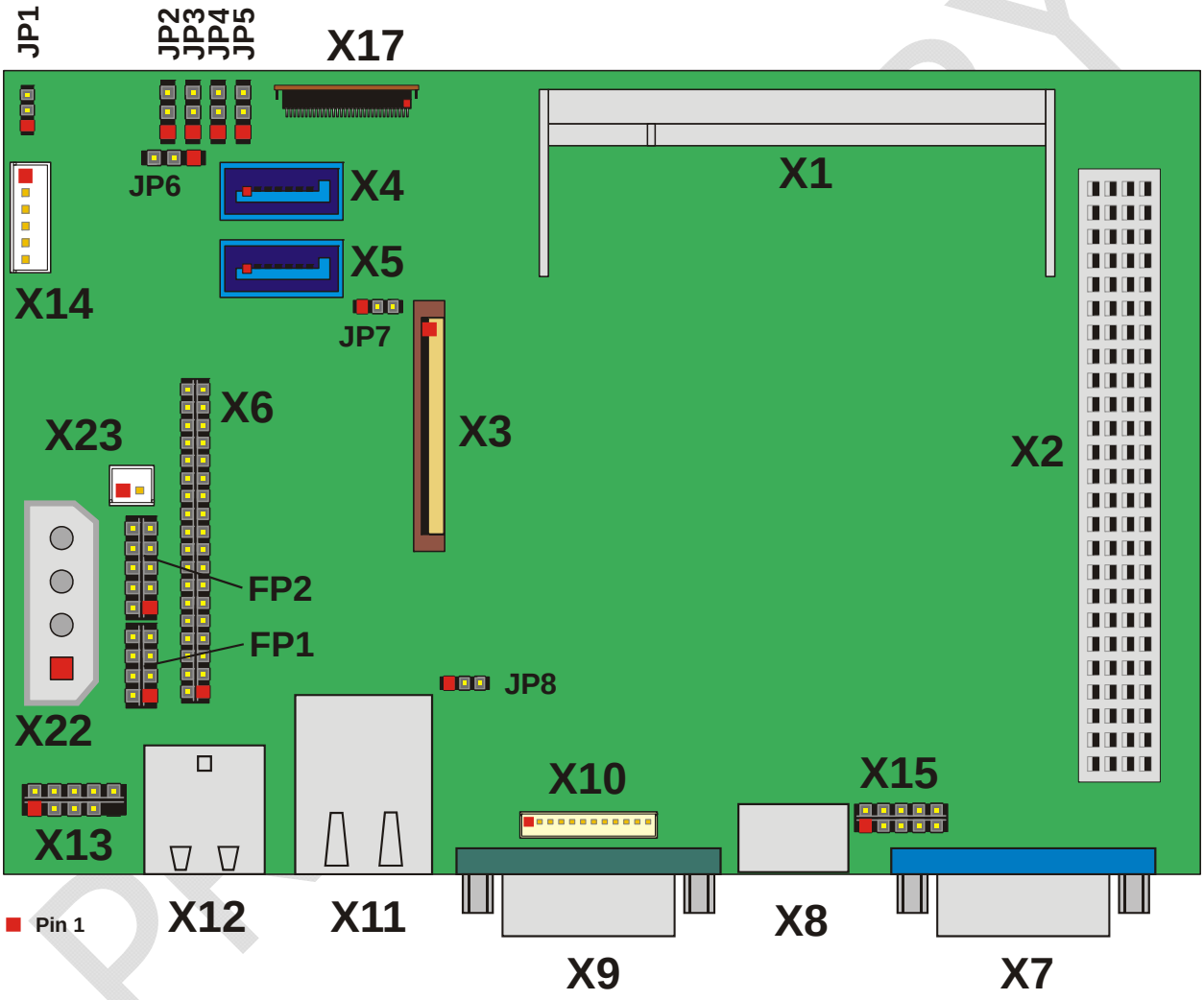
Appendix B: Connector Layout

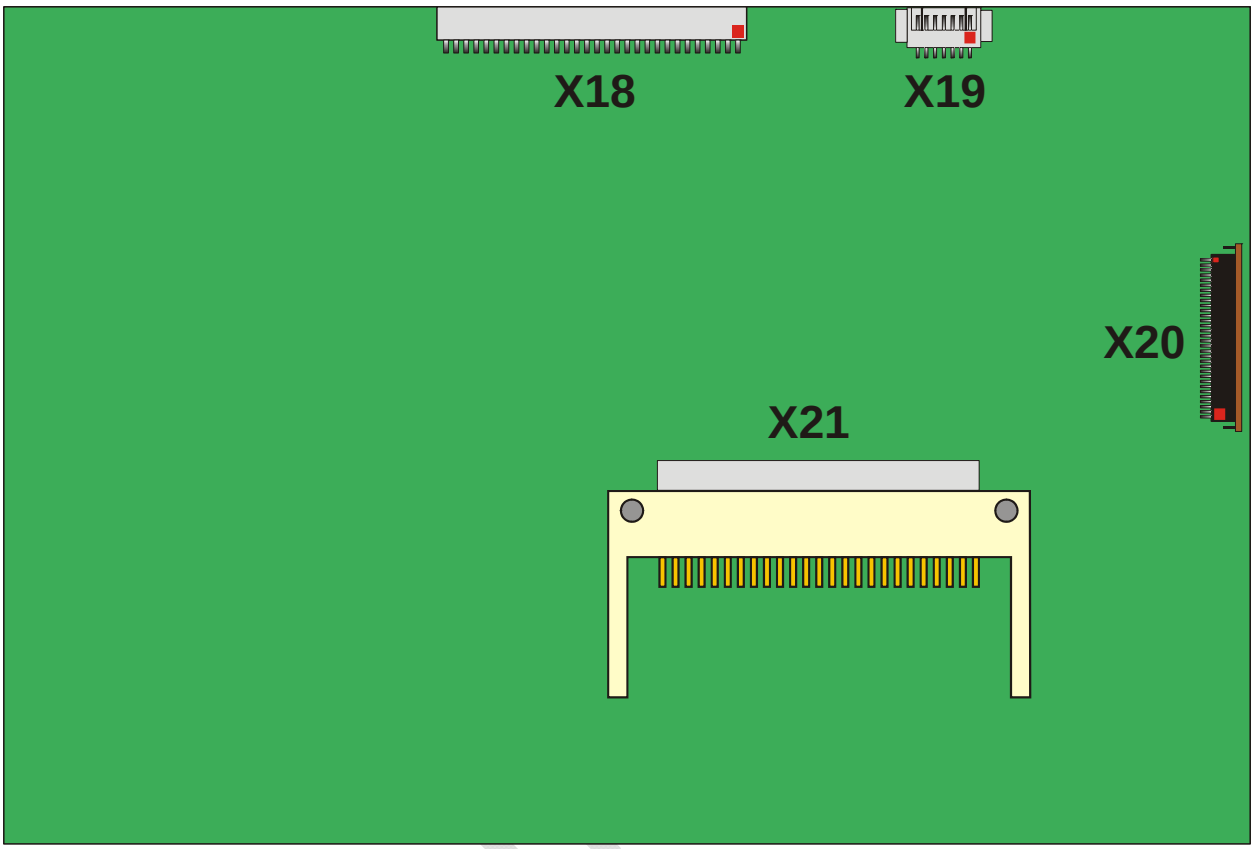
B.1 Connector Locations

B.1.1 Top Side



PROOF COPY

B.1.2 Bottom Side



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B.2 Pinout Tables

Pin	PC/104 plus (A)	PC/104 plus (B)	PC/104 plus (C)	PC/104 plus (D)
1	GND	Reserved	VCC5 *(2)*	AD0
2	VCC3 *(2)*	AD2	AD1	VCC5 *(2)*
3	AD5	GND	AD4	AD3
4	C/BE0	AD7	GND	AD6
5	GND	AD9	AD8	GND
6	AD11	VCC3 *(2)*	AD10	M66EN
7	AD14	AD13	GND	AD12
8	VCC3 *(2)*	C/BE1	AD15	VCC3 *(2)*
9	SERR *(1)*	GND	Reserved	PAR
10	GND	PERR *(1)*	VCC3 *(2)*	Reserved
11	STOP	VCC3 *(2)*	LOCK *(1)*	GND
12	VCC3 *(2)*	TRDY	GND	DEVSEL
13	FRAME	GND	IRDY	VCC3 *(2)*
14	GND	AD16	VCC3 *(2)*	C/BE2
15	AD18	VCC3 *(2)*	AD17	GND
16	AD21	AD20	GND	AD19
17	VCC3 *(2)*	AD23	AD22	VCC3 *(2)*
18	IDSEL0 (AD20)	GND	IDSEL1 (AD21)	IDSEL2 (AD22)
19	AD24	C/BE3	VCC3 *(2)*	IDSEL3 (AD23)
20	GND	AD26	AD25	GND
21	AD29	VCC5 *(2)*	AD28	AD27
22	VCC5 *(2)*	AD30	GND	AD31
23	REQ0	GND	REQ1	VCC3 *(2)*
24	GND	REQ2	VCC5 *(2)*	GNT0
25	GNT1	VCC3 *(2)*	GNT2	GND
26	VCC5 *(2)*	CLK0	GND	CLK1
27	CLK2	VCC5 *(2)*	CLK3	GND
28	GND	INTD	VCC5 *(2)*	RST
29	+12V *(2)*	INTA	INTB	INTC
30	NC	NC	NC	GND

PRELIMINARY

Pin	IDE X6	CF-Card X21	Floppy X3	LPT X20	CRT X7	JILI30 X18	18 Bit Digital X17
1	/RESET	GND	VCC *(2)*	VCC *(2)*	RED	FTX0-	GND
2	GND	D3	/IDX	GND	GRN	FTX0+	PCLK
3	D7	D4	VCC *(2)*	NC	BLU	FTX1-	PHS
4	D8	D5	/DR0	NC	NC	FTX1+	PVS
5	D6	D6	VCC *(2)*	NC	GND	FTX2-	GND
6	D9	D7	/DSKCHG	NC	GND	FTX2+	PR0
7	D5	/CS1	NC	NC	GND	GND	PR1
8	D10	GND	NC	NC	GND	FTXC-	PR2
9	D4	GND	NC	NC	VCC *(2)*	FTXC+	PR3
10	D11	GND	/MTR0	NC	GND	FTX3-	PR4
11	D3	GND	NC	GND	NC	FTX3+	PR5
12	D12	GND	/FDIR	/AFD	NC	NC	GND
13	D2	VCC *(2)*	NC	/STB	HSYNC	NC	PG0
14	D13	GND	/STEP	/ERR	VSYNC	GND	PG1
15	D1	GND	GND	D0	NC	NC	PG2
16	D14	GND	/WDATA	/INIT		NC	PG3
17	D0	GND	GND	GND		GND	PG4
18	D15	SA2	/WGATE	D1		NC	PG5
19	GND	SA1	GND	/SLIN		NC	GND
20	KEY (NC)	SA0	/TRK0	D2		NC	PB0
21	DRQ	D0	GND	D3		NC	PB1
22	GND	D1	/WRTPRT	GND		NC	PB2
23	/IOW	D2	GND	D4		NC	PB3
24	GND	NC	/RDATA	D5		GND	PB4
25	/IOR	GND	GND	D6		SDA	PB5
26	GND	GND	/HDSEL	D7		DATAENA	GND
27	IOCHRDY	D11		GND		SCL	PDE
28	CSEL	D12		/ACK		VCC *(2)*	VCC *(2)*
29	/DACK	D13		/BUSY		VCC *(2)*	VCC *(2)*
30	GND	D14		PE		VCC *(2)*	R/L
31	IRQ	D15		/SLCT			U/D
32	NC	/CS3		GND			NC
33	SA1	GND					
34	ATAD	/IOR					
35	SA0	/IOW					
36	SA2	VCC *(2)*					
37	/CS1	IRQ					
38	/CS3	VCC *(2)*					
39	ACT	GND					
40	GND	NC					
41	VCC *(2)*	/RESET					
42	VCC *(2)*	IOCHRDY					
43	GND	/DRQ					
44	NC	/DACK					
45		ACT					
46		NC					
47		D8					
48		D9					
49		D10					
50		GND					

Pin	PS/2 KBD Mouse X8	COM A X9	COM B RS-232 X10	COM B RS-422/485 X10	USB A X12	USB B X13
1	KBDAT	/DCD	/DCD	TX+ / (RX+)	VCC *(2)*	VCC *(2)*
2	MSDAT	RXD	/DSR	NC	USB0-	VCC *(2)*
3	GND	TXD	RXD	RX+	USB0+	USB2-
4	VCC *(2)*	/DTR	/RTS	NC	GND	USB3-
5	KBCLK	GND	TXD	TX- / (RX-)	VCC *(2)*	USB2+
6	MSCLK	/DSR	/CTS	NC	USB1-	USB3+
7		/RTS	/DTR	RX-	USB1+	GND
8		/CTS	/RI	NC	GND	GND
9		/RI	GND	GND		KEY (NC)
10			VCC *(2)*	VCC *(2)*		GND

Pin	Backlight X19	SATA X4 / X5	Ethernet X11	Audio X14	Digital I/O X15
1	NC	GND	TXD+ / BI_D1+	LINE_OUT_R	OUT1
2	BKLTADJ	TX+	TXD- / BI_D1-	GND	IN1
3	GND	TX-	RXD+ / BI_D2+	LINE_OUT_L	OUT2
4	VCC *(2)*	GND	BI_D3+	LINE_IN_R	IN2
5	VCC *(2)*	RX-	BI_D3-	MIC_IN	OUT3
6	GND	RX+	RXD- / BI_D2-	LINE_IN_L	IN3
7	BKLTON	GND	BI_D4+		OUT4
8			BI_D4-		IN4
9					VCC *(2)*
10					GND

Pin	Common Front Panel FP1	Power Front Panel FP2	Main Power X22	Power Supplem. X23
1	RST_BTN+	PWR_LED+	VDD *(2)*	/PS_ON
2	SPKR+	PWR_BTN+	GND	5VSB *(2)*
3	RST_BTN-	NC	GND	
4	NC	PWR_BTN-	VCC *(2)*	
5	HDD_LED+	PWR_LED-		
6	NC	NC		
7	HDD_LED-	KBD_LOCK		
8	SPKR-	RSVD		
9		GND		
10		RSVD		

PRELIMINARY

Note: *1 Not supported on the JRexplus LX board.*
2 To protect the external power lines of peripheral devices, make sure that
- the wires have the right diameter to withstand the maximum available current.
- the enclosure of the peripheral device fulfils the fire protecting conditions of IEC/EN 60950.

PRELIMINARY

Appendix C: Literature Hints

The following sources of information can help you better understand PC architecture.

C.1 General PC Architecture

- *Embedded PCs*, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)
- *Hardware Bible*, Winn L. Rosch, SAMS, 1997, 0-672-30954-8
- *Interfacing to the IBM Personal Computer*, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- *The Indispensable PC Hardware Book*, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9
- *The PC Handbook: For Engineers, Programmers, and Other Serious PC Users*, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

C.2 Buses

- *Embedded PC 104 Consortium*. The consortium provides information about PC/104 and PC/104-Plus technology. You can search for information about the consortium on the Web
- *PCI SIG*. The PCI SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI SIG. You can search for information about the SIG on the Web
- *PCI & PCI-X Hardware and Software Architecture & Design*, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9
- *PCI System Architecture,* Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2

PRELIMINARY

C.3 Ports

C.3.1 RS-232 Serial

- *EIA-232-E standard*. The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer. You can search for information about the standard on the Web
- RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3
- *National Semiconductor*. The Interface Data Book includes application notes. Type "232" as a search criteria to obtain a list of application notes. You can search for information about the data book on National Semiconductor's Website

C.3.2 ATA

- *AT Attachment (ATA) Working Group*. This X3T10 standard defines an integrated bus inter- face between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system. You can search for information about the working group on the Web. We recommend you also search the Web for information on *4.2 I/O cable*, if you use hard disks in a DMA3 or PIO4 mode.

C.3.3 USB

- *USB Specification*. USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adop- tion of Universal Serial Bus technology. You can search for information about the standard on the Web

C.4 Programming

- *C Programmer's Guide to Serial Communications*, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0
- *Programmer's Guide to the EGA, VGA, and Super VGA Cards*, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4
- *The Programmer's PC Sourcebook,* Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X
- *Undocumented PC, A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas*, Frank van Gilluwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

PRELIMINARY

APPENDIX D: REVISION HISTORY

Revision	Date	Edited by	Changes
0.1	02/20/2008	M. Hüttmann	First revision

PRELIMINARY